

Serial No. 09/870,288

Docket No. 15916-069x



In the Claims:

Please cancel claim 1 without prejudice.

Please add claims 44-105 as follows:

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44. A tissue ablation device for ablating a circumferential region of tissue associated with an orifice of a vein that carries blood to an atrium, comprising:

a member adapted to be positioned adjacent to the circumferential region of tissue; and

an ablation element associated with the member and adapted to form a lesion in a substantial portion of the circumferential region of tissue.

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45. A tissue ablation device as claimed in claim 44, wherein the member defines a size and shape corresponding to the circumferential region of tissue.

46. A tissue ablation device as claimed in claim 45, wherein the size and shape is adapted to engage the tissue surrounding one of a superior vena cava, an inferior vena cava and a pulmonary vein.

47. A tissue ablation device as claimed in claim 44, wherein the member comprises a collapsible member.

48. A tissue ablation device as claimed in claim 47, wherein the collapsible member comprises a collapsible loop structure.

49. A tissue ablation device as claimed in claim 44, wherein the ablation element comprises an energy emitting structure.

50. A tissue ablation device as claimed in claim 49, wherein the ablation element comprises a plurality of spaced-energy-emitting elements.

51. A tissue ablation device for ablating a substantial portion of a circumferential region of tissue where a pulmonary vein extends from an atrium, comprising:

an elongate body with a distal end portion and a proximal end portion;

an expandable member coupled to the elongate body adjustable between a radially collapsed condition and a radially expanded condition with an expanded outer diameter which is adapted to engage the substantial portion of the circumferential region of tissue;

an ablation element associated with the expandable member and adapted to emit a substantially circumferential pattern of energy and to ablatively couple to the substantial portion of the circumferential region of tissue engaged by the expandable member in the radially expanded condition when the ablation element is coupled to and actuated by an ablation actuator.

52. A tissue ablation device for ablating a substantial portion of a circumferential region of tissue where a vein extends from an atrium, comprising:

an elongate body with a distal end portion and a proximal end portion;

an expandable member coupled to the elongate body adjustable between a radially collapsed condition and a radially expanded condition with an expanded outer diameter which is adapted to engage the substantial portion of the circumferential region of tissue;

an ablation element associated with the expandable member and adapted to emit a substantially circumferential pattern of energy and to ablatively couple to the substantial portion of the circumferential region of tissue engaged by the expandable member in the radially expanded condition when the ablation element is coupled to and actuated by an ablation actuator.

~~53. A tissue ablation system for treating atrial arrhythmia in a patient,~~
comprising:

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a circumferential ablation member which is adapted to be delivered to a position relative to a circumferential region of tissue at a location where a pulmonary vein extends from an atrium in the patient, the circumferential ablation member having an ablation element which is adapted to ablate a substantial portion of the circumferential region of tissue without delivery of an ablative fluid to the tissue.

54. The system of claim 53, wherein the ablation element comprises a light emitting ablation element.

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55. The system of claim 53, wherein the ablation element comprises a tissue cooling ablation element.

56. The system of claim 53, wherein the ablation element comprises a microwave ablation element.

57. The system of claim 53, wherein the ablation element comprises a thermal ablation element.

58. The system of claim 53, wherein the ablation element is adapted to be coupled to and actuated by an ablation actuator.

59. The system of claim 53, further comprising an elongate body with a proximal end portion and a distal end portion, wherein the circumferential ablation member is located at least in part along the distal end portion, and the elongate body is adapted to deliver the circumferential ablation member to the desired position.

60. The system of claim 53, further comprising a delivery system cooperating
----- with the circumferential ablation member and which is adapted to deliver the -----
circumferential ablation member to the desired position.

61. The system of claim 53, wherein the ablation element is adapted to ablate
a substantial portion of the circumferential region of tissue without delivery of electrical
current.

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62. A tissue ablation system for treating atrial arrhythmia in a patient,
comprising:

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a circumferential ablation member which is adapted to be delivered to a
position relative to a circumferential region of tissue at a location where a vein extends
from an atrium in the patient, the circumferential ablation member having an ablation
element which is adapted to ablate a substantial portion of the circumferential region of
tissue without delivery of an ablative fluid to the tissue.

63. The system of claim 62, wherein the ablation element comprises a light
emitting ablation element.

64. The system of claim 62, wherein the ablation element comprises a tissue
cooling ablation element.

65. The system of claim 62, wherein the ablation element comprises a
microwave ablation element.

66. The system of claim 62, wherein the ablation element comprises a
thermal ablation element.

67. The system of claim 62, wherein the ablation element is adapted to be
----- coupled to and actuated by an ablation actuator.-----

68. The system of claim 62, further comprising an elongate body with a proximal end portion and a distal end portion, wherein the circumferential ablation member is located at least in part along the distal end portion, and the elongate body is adapted to deliver the circumferential ablation member to the desired position.

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69. The system of claim 62, further comprising a delivery system cooperating with the circumferential ablation member and which is adapted to deliver the circumferential ablation member to the desired position.

70. The system of claim 62, wherein the ablation element is adapted to ablate a substantial portion of the circumferential region of tissue without delivery of electrical current.

71. A tissue ablation device system for ablating a circumferential region of tissue at a location where a single pulmonary vein extends from an atrium in a patient, comprising:

an ablation member with a contact member which is adapted to substantially contact the circumferential region of tissue, and also with an ablation element which is adapted to be ablatively coupled to the circumferential region of tissue when the circumferential ablation member is positioned at the location; and

a delivery assembly that cooperates with the circumferential ablation member and that is adapted to deliver the circumferential ablation member to the location.

72. The tissue ablation device system of claim 71, wherein the contact member comprises a body that is adapted to have a looped geometry which substantially contacts the circumferential region of tissue.

73. The tissue ablation device system of claim 72, wherein the contact member is adapted to be positioned in a collapsed geometry within a delivery passageway of a delivery catheter and to be delivered through the delivery passageway and into the atrium; and

the contact member is adjustable to the looped geometry when the contact member is positioned externally of the delivery passageway.

74. The tissue ablation device system of claim 72, wherein the looped geometry is sized to engage the pulmonary vein.

75. The tissue ablation device system of claim 71, wherein the contact member is adjustable from a first configuration, which is adapted to be delivered through a delivery passageway of a delivery catheter and into the atrium, to a second configuration which is adapted to contact the circumferential region of tissue.

76. The tissue ablation device system of claim 71, wherein the delivery assembly comprises a delivery catheter with a proximal end portion and a distal end portion and a delivery passageway extending between a distal port along the distal end portion and a proximal port located proximally of the distal port; and

the ablation member is adapted to be advanced through the delivery passageway and into the atrium through the distal port.

77. The tissue ablation device system of claim 71, wherein the delivery assembly comprises an elongate body with a proximal end portion and a distal end portion; and

the ablation member is located at least in part along the distal end portion of the elongate body.

78. The tissue ablation device system of claim 77, wherein the contact member is located at least in part along the distal end portion of the elongate body.

79. The tissue ablation device system of claim 71, wherein the ablation element comprises at least one electrode that is adapted to couple to an electrical current source.

80. The tissue ablation device system of claim 71, wherein the ablation element comprises a plurality of electrodes that are located at least in part along the contact member and that are adapted to couple to an electrical current source.

81. The tissue ablation device system of claim 71, wherein the ablation element comprises a cooling ablation element.

82. The tissue ablation device system of claim 71, wherein the ablation element comprises a light emitting ablation element.


83. The tissue ablation device system of claim 71, wherein the ablation element comprises a microwave ablation element.

84. The tissue ablation device system of claim 71, wherein the ablation element comprises a thermal ablation element.

85. The tissue ablation device system of claim 71, wherein the ablation
-----element comprises a chemical fluid ablation element.-----

86. A tissue ablation device system for ablating a circumferential region of
tissue at a location where a pulmonary vein extends from an atrium, comprising:

a circumferential ablation member with an ablation element which is
adapted to ablatively couple to the circumferential region of tissue when the
circumferential ablation member is positioned along the location; and

 a delivery member with a proximal end portion and a distal end portion,
wherein the circumferential ablation member is located at least in part along the distal
end portion and is adapted to be delivered to the location at least in part with the
delivery member,

wherein the system is adapted to allow a volume of blood to flow from the
pulmonary vein, across the location, and into the atrium when the circumferential
ablation member is positioned along the location and the ablation element is ablatively
coupled to the circumferential region of tissue.

87. The tissue ablation device assembly as in claim 86, wherein the
circumferential ablation member additionally includes an expandable member
cooperating with the ablation element and which is adapted to substantially engage the
circumferential region of tissue when the ablation element is ablatively coupled to the
circumferential region of tissue.

88. The tissue ablation device assembly of claim 86, wherein the ablation
element further comprises an electrode ablation element.

89. The tissue ablation device assembly of claim 86, wherein the ablation
element further comprises a thermal ablation element.

90. The tissue ablation device assembly of claim 86, wherein the ablation element further comprises a light emitting ablation element.

91. The tissue ablation device assembly of claim 86, wherein the ablation element further comprises a microwave ablation element.

92. The tissue ablation device assembly of claim 86, wherein the ablation element further comprises a chemical ablation element.

93. A tissue ablation device system for ablating a circumferential region of tissue at a location where a single vein extends from an atrium in a patient, comprising:

an ablation member with a contact member which is adapted to substantially contact the circumferential region of tissue, and also with an ablation element which is adapted to be ablatively coupled to the circumferential region of tissue when the circumferential ablation member is positioned at the location; and

a delivery assembly that cooperates with the circumferential ablation member and that is adapted to deliver the circumferential ablation member to the location.


94. The tissue ablation device system of claim 93, wherein the contact member comprises a body that is adapted to have a looped geometry which substantially contacts the circumferential region of tissue.

95. The tissue ablation device system of claim 94, wherein the contact member is adapted to be positioned in a collapsed geometry within a delivery passageway of a delivery catheter and to be delivered through the delivery passageway and into the atrium; and

the contact member is adjustable to the looped geometry when the contact member is positioned externally of the delivery passageway.

~~96. The tissue ablation device system of claim 94, wherein the looped geometry is sized to engage the vein.~~

97. The tissue ablation device system of claim 93, wherein the contact member is adjustable from a first configuration, which is adapted to be delivered through a delivery passageway of a delivery catheter and into the atrium, to a second configuration which is adapted to contact the circumferential region of tissue.

 98. The tissue ablation device system of claim 93, wherein the delivery assembly comprises a delivery catheter with a proximal end portion and a distal end portion and a delivery passageway extending between a distal port along the distal end portion and a proximal port located proximally of the distal port; and

the ablation member is adapted to be advanced through the delivery passageway and into the atrium through the distal port.

99. The tissue ablation device system of claim 93, wherein the delivery assembly comprises an elongate body with a proximal end portion and a distal end portion; and


the ablation member is located at least in part along the distal end portion of the elongate body.

100. The tissue ablation device system of claim 99, wherein the contact member is located at least in part along the distal end portion of the elongate body.

101. The tissue ablation device system of claim 93, wherein the ablation element comprises at least one electrode that is adapted to couple to an electrical current source.

-----102. The tissue ablation device system of claim 93, wherein the ablation-----
element comprises a plurality of electrodes that are located at least in part along the
contact member and that are adapted to couple to an electrical current source.

103. The tissue ablation device system of claim 93, wherein the ablation
element comprises a cooling ablation element.

 104. The tissue ablation device system of claim 93, wherein the ablation
element comprises a light emitting ablation element.

105. The tissue ablation device system of claim 93, wherein the ablation
element comprises a microwave ablation element.

106. The tissue ablation device system of claim 93, wherein the ablation
element comprises a thermal ablation element.

107. The tissue ablation device system of claim 93, wherein the ablation
element comprises a chemical fluid ablation element.

108. A tissue ablation device system for ablating a circumferential region of
tissue at a location where a vein extends from an atrium, comprising:

a circumferential ablation member with an ablation element which is
adapted to ablatively couple to the circumferential region of tissue when the
circumferential ablation member is positioned along the location; and

a delivery member with a proximal end portion and a distal end portion,
wherein the circumferential ablation member is located at least in part along the distal
end portion and is adapted to be delivered to the location at least in part with the
delivery member,

wherein the system is adapted to allow a volume of blood to flow from the
----- vein, across the location, and into the atrium when the circumferential ablation member -----
is positioned along the location and the ablation element is ablatively coupled to the
circumferential region of tissue.

109. The tissue ablation device assembly as in claim 108, wherein the
circumferential ablation member additionally includes an expandable member
cooperating with the ablation element and which is adapted to substantially engage the
circumferential region of tissue when the ablation element is ablatively coupled to the
circumferential region of tissue.

110. The tissue ablation device assembly of claim 108, wherein the ablation
element further comprises an electrode ablation element.

111. The tissue ablation device assembly of claim 108, wherein the ablation
element further comprises a thermal ablation element.

112. The tissue ablation device assembly of claim 108, wherein the ablation
element further comprises a light emitting ablation element.

113. The tissue ablation device assembly of claim 108, wherein the ablation
element further comprises a microwave ablation element.

114. The tissue ablation device assembly of claim 108, wherein the ablation
element further comprises a chemical ablation element.

115. A method for treating atrial arrhythmia in a patient, comprising:

----- positioning a tissue-ablation device adjacent to a circumferential-region of -----
tissue associated with an orifice of a vein that carries blood to an atrium; and
forming a circumferential conduction block in the circumferential region of
tissue with the tissue ablation device.

116. A method as claimed in claim 115, wherein the step of positioning a tissue
ablation device comprises positioning a tissue ablation device having a shape
corresponding to the orifice.

117. A method as claimed in claim 116, wherein the step of positioning a tissue
ablation device comprises positioning a tissue ablation device adjacent to one of a
superior vena cava, an inferior vena cava and a pulmonary vein.

118. A method as claimed in claim 115, wherein the step of positioning a tissue
ablation device comprises collapsing the tissue ablation device, inserting the tissue
ablation device into the heart, and expanding the tissue ablation device after the tissue
ablation device is within the heart.

119. A method as claimed in claim 115, wherein the step of positioning a tissue
ablation device comprises positioning a bendable loop structure that supports at least
one tissue ablation element.

120. A method as claimed in claim 115, wherein the step of positioning a tissue
ablation device comprises positioning an annular structure that supports at least one
tissue ablation element.

121. A method as claimed in claim 115, wherein the step of positioning a tissue ablation device comprises positioning the tissue ablation device such that it encircles the orifice.

122. A method as claimed in claim 115, wherein the step of forming a conduction block comprises forming a continuous conduction block.

123. A method as claimed in claim 115, wherein the step of forming a conduction block comprises applying ablating energy to the tissue.

124. A method as claimed in claim 115, wherein the step of forming a conduction block comprises applying electromagnetic ablating energy to the tissue.

125. A method as claimed in claim 115, wherein the step of forming a conduction block comprises cooling the tissue.

126. A method for treating atrial arrhythmia by ablating a substantial portion of a circumferential region of tissue at a location where a pulmonary vein extends from an atrium in a patient, comprising:

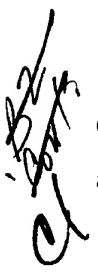
providing an ablation element coupled to an energy driver, and coupled to a tissue coupling assembly;

contacting the substantial portion of the circumferential region of tissue with at least a portion of the tissue coupling assembly, such that the ablation element is positioned to deliver a substantially circumferential pattern of energy through the tissue coupling assembly to the substantial portion of the circumferential region of tissue; and

actuating the energy driver to ablatively couple the ablation element to the substantial portion of the circumferential region of tissue via the tissue coupling assembly.

127. The method of claim 126, wherein contacting at least the substantial portion of the circumferential region of tissue comprises expanding an expandable member of the tissue coupling assembly to radially engage the substantial portion of the circumferential region of tissue.

128. The method of claim 126, wherein the entire circumferential region of tissue is ablatively coupled to the ablation element.

 129. The method of claim 128, wherein contacting the substantial portion of the circumferential region of tissue comprises contacting the portion of the tissue coupling assembly with the entire circumferential region of tissue.

130. A method for treating atrial arrhythmia by ablating a substantial portion of a circumferential region of tissue at a location where a vein extends from an atrium in a patient, comprising:

providing an ablation element coupled to an energy driver, and coupled to a tissue coupling assembly;


contacting the substantial portion of the circumferential region of tissue with at least a portion of the tissue coupling assembly, such that the ablation element is positioned to deliver a substantially circumferential pattern of energy through the tissue coupling assembly to the substantial portion of the circumferential region of tissue; and

actuating the energy driver to ablatively couple the ablation element to the substantial portion of the circumferential region of tissue via the tissue coupling assembly.

131. The method of claim 130, wherein contacting at least the substantial portion of the circumferential region of tissue comprises expanding an expandable member of the tissue coupling assembly to radially engage the substantial portion of the circumferential region of tissue.

~~132. The method of claim 130, wherein the entire circumferential region of~~
tissue is ablatively coupled to the ablation element.

133. The method of claim 132, wherein contacting the substantial portion of the circumferential region of tissue comprises contacting the portion of the tissue coupling assembly with the entire circumferential region of tissue.


 134. A method for treating atrial arrhythmia in a patient, comprising:
forming a circumferential conduction block in a circumferential region of tissue at a location where a pulmonary vein extends from an atrium in the patient,
wherein the circumferential conduction block formed is continuous along the circumferential region of tissue, and
wherein the circumferential conduction block is formed without contacting the tissue with an ablative fluid medium.

135. The method of claim 134, wherein the atrial arrhythmia originates at least in part from an arrhythmogenic origin located along the pulmonary vein wall, and wherein the circumferential conduction block is located at a position which is between the arrhythmogenic origin and the left atrial wall, such that the left atrium is isolated from the electrical conduction propagating from the arrhythmogenic origin.

136. The method of claim 134, further comprising:
ablating the circumferential region of tissue with a circumferential ablation device assembly having a circumferential ablation element coupled to a circumferential ablation member located on a distal end portion of an elongate catheter body, thereby forming a circumferential lesion which comprises the circumferential conduction block.

137. A method as recited in claim 134, further comprising forming the
-----circumferential conduction block without delivering an electrical current through an-----
ablative fluid medium.

138. A method as recited in claim 134, further comprising forming the
circumferential conduction block without contacting the tissue with an ablative fluid
medium that chemically ablates the tissue.

 139. A method as recited in claim 134, further comprising forming the
circumferential conduction block with an ablation element selected from the group of
ablation elements consisting of a thermal ablation element, a cryogenic ablation
element, a microwave ablation element, and an optical ablation element.

140. A method for treating atrial arrhythmia in a patient, comprising:
forming a circumferential conduction block in a circumferential region of
tissue at a location where a vein extends from an atrium in the patient,
wherein the circumferential conduction block formed is continuous along
the circumferential region of tissue, and
wherein the circumferential conduction block is formed without contacting
the tissue with an ablative fluid medium.

141. The method of claim 140, wherein the atrial arrhythmia originates at least
in part from an arrhythmogenic origin located along the vein wall, and wherein the
circumferential conduction block is located at a position which is between the
arrhythmogenic origin and the left atrial wall, such that the left atrium is isolated from
the electrical conduction propagating from the arrhythmogenic origin.